applicant's claimed invention, three new dependant claims have been added, as shown above.

Reconsideration of the rejection of claims 1, 4, 16-17, and 19 under 35 U.S.C. 102(e) as anticipated by Alers et al., U.S. Patent 6,320,244 B1 is respectfully requested for the following reasons.

The applicant's invention is a method for making a MIM capacitor that has high-dielectric-constant material and also utilizes a wide band-gap (low-k dielectric) material to minimize leakage currents. The wide band-gap material is very thin (10 to 50 Angstroms) and is sandwiched between the electrodes and the high-dielectric material.

Referring to the Examiner's Office Action, page 2, Item 2, the Examiner states re: Alers et al.

"...depositing a first wide-band-gap insulating layer 64 on the bottom electrode; depositing a multi-layer of high-k dielectric film 66 over the wideband-gap insulating layer; depositing a second wide-band-gap insulating layer 68 over the multi-layer;..."

The details of Alers' process for making the capacitor dielectric 46 as a composite dielectric are described in column 7, lines 27-39. Alers does not use or suggest a wide-band-gap dielectric, but describes using metal oxides with a relatively high dielectric constant, such as TiO_2, ZrO_2, and RuO_2. The use of these relatively high-dielectric constant metal oxides directs one away from the applicant's

invention which uses a wide-band-gap dielectric to minimize leakage currents. It is not clear where the Examiner is referring to the use of a wide-band-gap insulator in Alers' text, as cited by the Examiner on page 2 of the Office Action.

Since Alers et al. direct one away from the applicant's invention, the applicant's invention, claim 1, is not anticipated by and is patentable over Alers et al.

The applicant's claim 4 is a dependant claim that does not stand on its own merit but is in support of the independent claim 1.

Since the applicant uses the wide band-gap layers to reduce the leakage current between the capacitor electrodes and the multilayer of high-k dielectric films, the argument cited above is still valid for the independent claim 16, which is for a second embodiment of the invention. Therefore, the applicant's invention, claim 16, is not anticipated by Alers et al.

Applicant's claims 17 and 19 are dependent claims that does not stand on their own merits but are in support of the independent claim 16.

Reconsideration of the rejection of claims 2-3, 5-15, 18 and 20 under 35 U.S.C. 103(a) as being unpatentable over Alers et al., U.S. Patent 6,320,244 B1, in view of Yoon et al., U.S. Patent 5,688,724, is respectfully requested for the following reasons.

Referring to page 3, item 3, the Examiner states "...depositing a first TiO_2 wide-band-gap insulating layer 64 on the bottom electrode (column 7, lines 29-32);"

Alers et al. actually deposit a metal oxide with a relatively high dielectric constant. Alers et al. are silent on the use of a wide-band-gap insulator. Therefore, it is not clear where the Examiner is referring to in Alers' text that cites the use of a wide-band-gap insulator.

As the Examiner points out on page 4, Yoon et al. teach the use of a dielectric layer such as SiO_2, TiO_2, Si_3N_4, and Al_2O_3.

However, though Alers et al. teach the use of a relatively high dielectric constant, such as TiO_2, ZrO_2, and RuO_2 and does not direct one toward the use of a wide-band-gap insulator, one would not be motivated from Yoon et al. to substitute an Al_2O_3 insulator for the TiO_2 insulating layer in Alers et al. Therefore, since Alers et al. do not teach the applicant's invention, then Alers et al. in view of Yoon et al. do not make obvious the applicant's invention claim 10.

Claims 2-3, 5-9, 11-15, 19, and 20 are dependent claims that do not stand on their own merits but support their respective independent claims 1, 10, and 16.

RESPONSE TO EXAMINER'S ARGUMENT IN FINAL OFFICE ACTION

In the Examiner's Response to Arguments in Final Office Action the Examiner states "Applicant argues that Alers et al. do not teach a wide-band-gap insulating layer. The argument is not persuasive because applicant does not claim how to define the wide-band-gap insulating layer; it can be thin or thick. Therefore, any insulating layer can be considered as a wide-band-gap layer. Thus, Alers et al. teach in figure 9 a wide-band-gap insulating layer (64/68), as claimed."

In response to the Examiner's argument, the applicant's first and second wide-band-gap insulating layers of Al_2O_3 and SiO_2 were selected to have wide band-gap that is respectively 8.7 and 8.9 to minimize the leakage current.

By contrast, Alers in view of Yoon in fact directs one away from the applicant's claimed invention by citing TiO_2, ZrO_2, and RuO_2 as insulators. For example, TiO_2 has a relatively narrow band-gap width of about 3.5 eV and a relatively high dielectric constant of about 80, as shown in Table 1 and on page 5254 in Journal of Applied Physics, Vol. 89, No. 10, May 15, 2001. Therefore, the prior art directs one to the use of a high-k material instead of a wide-band-gap, and therefore to a relatively high-leakage-current insulating material. See Alers, col. 5, lines 7-13.

To distinguish the applicant's claimed invention from the cited prior art, and to define more specifically the wide-band-gap materials that the Examiner cites as the grounds for rejection in the Examiner's Response to Arguments on page 6, three new dependent claims have been added. These new claims do not add new material but distinguish the wide band-gap materials of the applicant's claimed invention (band-gap widths greater than about 8.0 eV) from narrow band-gap materials in the cited references of Alers and Yoon.

The Examiner is correct that the INTRINSIC band-gap width of the insulator is independent of the insulator thickness. However, the wider the band-gap, the thinner the insulating layer that the inventor can use to reduce leakage current. The applicant's claimed invention, which uses a wide-band-gap insulator, is not intended to minimize the reaction of the capacitor high-k dielectric with the upper and lower metal electrodes, as cited in Alers Abstract and as shown in Alers's Fig. 9.

Allowance of claims 1-23 is respectfully requested.

It is requested that the Examiner T. T. Doan call the undersigned Attorney at (845) 452-5863 should there be anything that can be done to help bring this Patent Application to Allowance.

Respectfully submitted,

Stephen B. Ackerman

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